Namit Anand

Curriculum Vitæ

NASA Quantum AI Lab
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Bio

I'm a Staff Scientist working in quantum information theory and quantum computation at the Quantum AI Lab at NASA Ames Research Center and KBR. I received my PhD in Physics from the University of Southern California under the supervision of Paolo Zanardi, coadvised by Todd Brun and Aaron Lauda. Before that, I received my Integrated Master of Science in Physics from the National Institute of Science Education and Research, Bhubaneswar, India.

Research interests

Application of quantum information-theoretic tools to many-body theory (specifically, information scrambling, quantum chaos, and many-body localization), quantum resource theories (specifically, quantum coherence and entanglement), open quantum systems and non-Markovian processes, quantifying the role of coherence and entanglement in quantum algorithms, error mitigation for NISQ-devices, non-universal models of quantum computation (Clifford group, matchgates, etc.), simulation of quantum optics, benchmarking quantum devices, classical shadow tomography.

Employment

2024 – present **Staff Scientist**, *NASA Quantum AI Lab (QuAIL) and KBR*, Mountain View, CA, USA.

2022 – 2024 **Postdoctoral Researcher**, *NASA Quantum AI Lab (QuAIL) and KBR*, Mountain View, CA, USA.

Education

2017 – 2022 **Doctor of Philosophy, Physics**, *University of Southern California*, Los Angeles, CA, USA.
Advisor: Paolo Zanardi. *Co-advisors*: Todd A. Brun and Aaron Lauda.
Thesis: Quantum information-theoretic aspects of chaos, localization, and scrambling [link]

2016 – 2017 **Visiting Student Researcher, Physics**, *Harish-Chandra Research Institute*, Prayagraj, India.

2011 – 2016 **Integrated Master of Science (BSc +MSc), Physics**, *National Institute of Science Education and Research*, Bhubaneswar, India.

Publications & Preprints

1. **General protocols for the efficient distillation of indistinguishable photons**, *arXiv:2404.14217 (2024)*, Jason Saied, Jeffrey Marshall, Namit Anand, Eleanor G. Rieffel.

2. **Dual-Unitary Classical Shadow Tomography**, *arXiv:2404.01068 (2024)*, Ahmed A. Akhtar, Namit Anand, Jeffrey Marshall, Yi-Zhuang You.
3. **Advancing Quantum Networking: Some Tools and Protocols for Ideal and Noisy Photonic Systems**, *Proc. SPIE 12911, Quantum Computing, Communication, and Simulation IV, 1291106 (2024)*, Jason Saied, Jeffrey Marshall, Namit Anand, Shon Grabbe, Eleanor G. Rieffel.
4. **Simulation of quantum optics by coherent state decomposition**, *Optica Quantum* ***1****(2), 78-93 (2023)*, Jeffrey Marshall and Namit Anand.
   – Featured on the cover of Optica Quantum
5. **Scrambling and operator entanglement in local non-Hermitian quantum systems**, *Phys. Rev. B* ***108****, 134305 (2023)*, Brian Barch*, Namit Anand*, Jeffrey Marshall, Eleanor Rieffel, Paolo Zanardi.
   – PRB Editors' Suggestion, * = equal contribution.
6. **Scrambling of Algebras in Open Quantum Systems**, *Phys. Rev. A* ***107****, 042217 (2023)*, Faidon Andreadakis, Namit Anand and Paolo Zanardi.
   – PRA Editors' suggestion
7. **BROTOCs and Quantum Information Scrambling at Finite Temperature**, *Quantum* ***6****, 746 (2022)*, Namit Anand and Paolo Zanardi.
8. **Quantum coherence as a signature of chaos**, *Phys. Rev. Research* ***3****, 023214 (2021)*, Namit Anand, Georgios Styliaris, Meenu Kumari, and Paolo Zanardi.
9. **Information Scrambling and Chaos in Open Quantum Systems**, *Phys. Rev. A* ***103****, 062214 (2021)*, Paolo Zanardi and Namit Anand.
10. **Information Scrambling over Bipartitions: Equilibration, Entropy Production, and Typicality**, *Phys. Rev. Lett.* ***126****, 030601 (2021)*, Georgios Styliaris, Namit Anand, and Paolo Zanardi.
11. **Quantum coherence and the localization transition**, *Phys. Rev. B* ***100****, 224204 (2019)*, Georgios Styliaris, Namit Anand, Lorenzo Campos Venuti, and Paolo Zanardi.
12. **Quantifying non-Markovianity: a quantum resource-theoretic approach**, *arXiv:1903.03880 (2019)*, Namit Anand and Todd A. Brun.
13. **Demonstration of fidelity improvement using dynamical decoupling with superconducting qubits**, *Phys. Rev. Lett.* ***121****, 220502 (2018)*, Bibek Pokharel, Namit Anand, Benjamin Fortman, and Daniel A. Lidar.
    – Popular summary of our work in Phys.org, ScienceDaily, and the Scientific American.
14. **Asymmetry and coherence weight of quantum states**, *Phys. Rev. A* ***97****, 032342 (2018)*, Kaifeng Bu, Namit Anand, and Uttam Singh.
15. **Coherence and Entanglement Monogamy in the Discrete Analogue of Analog Grover Search**, *arXiv:1611.04542 (2016)*, Namit Anand and Arun K. Pati.
16. **Comment on "Limitations on the superposition principle: superselection rules in non-relativistic quantum mechanics"**, *Eur. J. Phys.* ***37*** *048003 (2016)*, Namit Anand.
17. **Do quantum strategies always win?**, *Quantum Information Processing* ***14*** *(11), 4027-4038 (2015)*, Namit Anand and Colin Benjamin.

⋆ [Google Scholar] and [arXiv].

Academic Service

Referee QIP 2023, Physical Review X, Physical Review Letters, PRX Quantum, Physical Review Research, Physical Review B, Physical Review E, Physical Review A

Conference Organizer YQIS 2021

Invited Seminars

1. **Information-theoretic aspects of scrambling and chaos**, *IIT Madras, India*, Jan. 11, 2024.
2. **Information-theoretic aspects of scrambling and chaos**, *IMSc Chennai, India*, Jan. 10, 2024.
3. **Information-theoretic aspects of scrambling and chaos**, *ICTS Bangalore, India*, Jan. 8, 2024, link to seminar page.
4. **Quantum information-theoretic aspects of scrambling, localization, and chaos**, *University of Luxembourg & Donostia International Physics Center, Spain*, June 29, 2023, Adolfo del Campo and Aurelia Chenu's group.
5. **Random unitaries, quantum chaos, and all that**, *University of New South Wales, Australia*, May 25, 2023, Andrea Morello's group.
6. **Quantum information-theoretic aspects of scrambling, localization, and chaos**, *UC San Diego, USA*, Oct. 4, 2022, CMT Journal Club.
7. **Quantum information-theoretic aspects of scrambling, localization, and chaos**, *IIT Kanpur, India*, Aug. 26, 2022, Young Quantum Condensed Matter (YQCM) seminar series.
8. **Information-theoretic aspects of scrambling and chaos**, *IIT Madras, India*, Feb. 11, 2022, Arul Lakshminarayan's group.

Teaching Experience

(Fall '17 & Spring '18) Graduate Teaching Assistant for Physics 135aL: Physics for the Life Sciences. Student Evaluation Rating: 5.0/5.0

Awards and Fellowships

2022 Robust Quantum Simulation (RQS) Postdoctoral Fellowship (Declined)

Summer 2021 Recipient of the USC Gold Family Fellowship.
Award: $5,000 (USD)

Summer 2018 Recipient of the Quantum computing fellowship at the Los Alamos National Laboratory.
Award: $12,200 (USD)

2017 – 2022 University of Southern California, Department of Physics & Astronomy.
Award: $27,500 (USD) annually; full financial support through teaching assistantship and one year of fellowship for completion of the Ph.D. program.

2017 Graduate fellowships declined for USC: University of Maryland; Dartmouth College; Université libre de Bruxelles; Scuola Normale Superiore di Pisa.

Summer 2015	One of the five summer fellows (internationally) for the fully funded I.I.A.S.S. Summer internship program, Italy. Award: €3,000.
2011 – 2016	Recipient of Innovation in Science Pursuit for Inspired Research (INSPIRE) scholarship by the Department of Science and Technology, Government of India from 2011 - 2016. Award: ₹80,000/year for 5 years.

Computational Skills

Programming Languages	C++, Python
Specialized Software	Mathematica and MATLAB
Markup Languages	LaTeX, HTML, HTML5, PHP
Software adept	Adobe Suite (Photoshop, Audition) and Game Development (UDK)
Numerical packages	*Lapack* for C++ & Python, MATLAB on HPC, and CVX for convex optimization in MATLAB
Quantum simulations	Simulating quantum error-correction on the IBM Quantum Experience

Professional References

Paolo Zanardi

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University of Southern California
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[Webpage]

Todd A. Brun

Professor of Electrical Engineering-Systems, Computer Science, and Physics and Astronomy
University of Southern California
Email: tbrun@usc.edu
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Daniel A. Lidar

(*Viterbi Professor of Engineering*)
Professor of Electrical Engineering-Systems, Chemistry, and Physics and Astronomy
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Arun K. Pati

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